

**REMARKS/ARGUMENTS**

Claims 14 and 17-21 are pending in this application. Claims 1-13 and 15-16 have been canceled. The pending claims were previously examined in parent Application No. 09/793,432, Office Action dated 29 April 2003 (hereinafter "Office Action") wherein claims 14 and 17-21 were rejected under 35 USC 103(a) over Khan et al., US Patent No. 5,182,670 (hereinafter Khan), in view of Edmond et al., US Patent No. 5,093,576 (hereinafter Edmond). Consideration of the following remarks is respectfully requested.

For ease of reference, relevant portions of the Office Action are pasted below:

Khan et al. discloses a filter system which is integral with the photodetector whereby the alternating AlGaIn layers 84, 88 are deposited on the photodetector 85. The photodetector is not specified, however given that it is used in flame combustion temperature detection one of ordinary skill in the art would be motivated to use a silicon carbide photodetector with its two silicon carbide crystalline layers 12,13 (could be 6H type crystalline silicon carbide layers) and a passivation layer epitaxially grown one on top of each other as disclosed by Edmond et al. One would be motivated to have the integral filter grown on top of the last semiconductor layer since as taught by Edmond et al. having filters of alternating silicon dioxide and silicon nitride layers are commonly available and used with silicon carbide photodiodes (see Col.10, lines 48-57).

Applicant's arguments with respect to claims 14-21 have been considered but are not persuasive. The Applicant argues that because reference 85 is not explicitly described in the specification of reference Khan et al. and because in figure 8B the reference 85 has crosshatchings such as the crosshatchings of the filters shown in Fig.6B, it can be concluded that reference 85 is not a photodetector. That is not the case however, because even though reference 85 is not specified as a photodetector, it is safe to conclude that it is a photodetector based on the fact that in Fig.7B reference 78 which is named in the specification a detector (see Col.8, line 43) has the same crosshatching as does reference 85. As such, the claims are still rejected as shown in detail above.

For further ease of reference, portions of Khan relating to FIGs. 6-8 are pasted below with comments in italics inserted by Applicant.

*FIGs. 6A-6B (Column 7, lines 52-65)*

A Fabry-Perot cavity filter may also be fabricated according to the invention comprising two quarter wave mirrors separated by a spacer layer, FIGS. 6A and 6B.

As seen, the filter 60 comprises two filters 62 and 66 separated by a spacer 64. Each filter comprises a discrete number of AlGaIn layers grown in series to define a wavelength bandgap cutoff. The spacer layer comprises AlGaIn grown in accordance with the CVD processes disclosed herein. Generally, the filter assembly may be grown on a substrate 68 chosen from any number of materials such as sapphire.

Finally, a detector 65 may be grown or otherwise attached on the reverse side of the substrate 68. ....

....  
*The layers in FIGs. 6A-6B are thus (in order from top to bottom as shown in FIG. 6B):*

*Filter 62  
Spacer 64  
Filter 66  
Substrate 68  
Detector 65*

*FIGs. 7A-7B (Column 8, lines 30-50)*

The top of the filter 73, FIG. 7A, shows a circular structure which may comprise a bottom conducting aluminum nitride layer 77. In between contact 72 and substrate 77 lies a filter (73) - spacer (74) - filter (75) structure with the filters comprising alternating layers of AlGaIn in accordance with the invention and the spacer comprising aluminum gallium nitride. An electric field may be applied between

the top circular contact 72 and the bottom structure 76. The electric field may be used to modify the refractive index and shift the central location of the filter. The electric field lines (arrows, FIG. 7B) may be vertical in the device and effectively modify the refractive index. Since the detector 78 is on the face opposite the substrate 77 and the filter is transmissive, the bottom electrode 76 must be able to pass 290 nm. This generally requires a high Al molar concentration AlGaN composition and even possibly an aluminum nitride film as layer 77. Further, these films are generally doped since as grown Al.sub.x Ga.sub.1-x N films with x greater than 40-50% are insulating.

*The layers in FIGs. 7A-7B are thus (in order from top to bottom as shown in 7B):*

*Contact 72*

*Filter 73*

*Spacer 74*

*Filter 75 on same layer as bottom electrode 76*

*Substrate 77*

*Detector 78*

*FIGs. 8A-8B (Column 8, lines 51-64)*

The second filter configuration, FIGS. 8A and 8B, is an interdigitated structure. Here, a filter - spacer - filter configuration similar to that seen in FIGS. 7A and 7B is formed on a substrate of sapphire and has schottky contacts 82 of metal such as gold, titanium, or chromium, for example deposited on its upper surface. In this device, the electric field is generated by applying a voltage between the interdigitated fingers 82 of a metal such as gold, titanium, or chromium. A fringing electric field will penetrate down to the spacer 86 and modify the refractive index. Applying the field in this manner may be less effective than the circular structure but does not require the use of a conductive bottom electrode.

*The layers in FIGs. 8A-8B are thus (in order from top to bottom as shown in 8B):*

*Contact 82*

*Filter 84*

*Spacer 86*

*Filter 88*

*Substrate 85 (since the filter-spacer-filter layer is described as being formed on sapphire substrate)*

Reading Khan in the light described in italics above, Applicants respectfully traverse the above Office Action statements.

Claim 14 recites "a silicon carbide photodiode" and "an integral aluminum gallium nitride filter on the second semiconductor layer." In Khan, the only embodiment with a detector (FIG. 6B) shows the detector on an opposing side of the substrate and not integral to any photodiode or on any photodiode. The Office Action suggestion that element 85 of Khan is a photodetector simply does not make sense in light of the Khan text at column 8, lines 52-55, which states "a filter - spacer - filter configuration similar to that seen in FIGS. 7A and 7B is formed on a substrate of sapphire ..." (emphasis added).

Each of the other independent claims (17-19) recites "fabricating an integral filter over a silicon carbide photodiode."

Edmonds was described as an example of a silicon carbide photodiode having a passivation layer and language about filters was cited in the Office Action with reference to Edmonds column 10, lines 48-57:

If further desired, the photodiode of the present invention can be used in conjunction with a solar-blind blocking filter. Such filters are commonly formed of a plurality of alternating layers of silicon dioxide (SiO<sub>2</sub>) and silicon nitride (Si<sub>3</sub>N<sub>4</sub>) and are commonly available for UV photodetectors of all types. An appropriate filter can thus be selected and used with the present invention without undue experimentation. The filter prevents incident light of wavelengths greater than about 290 nm from reaching the top layer.

Applicants cannot find any reference to the Edmonds filter being an integral filter and submit that none of Khan, Edmonds, or any combination of Khan and Edmonds teaches the above quoted independent claim recitations.

Applicants continue to assert that the integral filter in claim 14 and the fabrication techniques in claims 17-19 are not disclosed, taught, or suggested by any combination of Khan and Edmond.

Accordingly, Applicants respectfully submit that claim 14, claims 20-21 which depend therefrom, claim 17, claim 18, and claim 19 define allowable subject matter over Khan and Edmond.

Respectfully submitted,

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